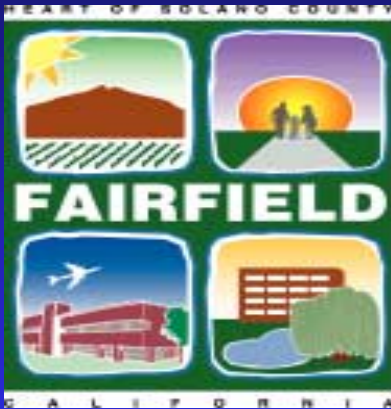


City of Fairfield

Wireless Traffic Signal Communication



Kevin Daughton, Transportation Manager
Steven Harris, Traffic Signal Technician



Elbert Chang, Senior Engineer

Presentation Outline

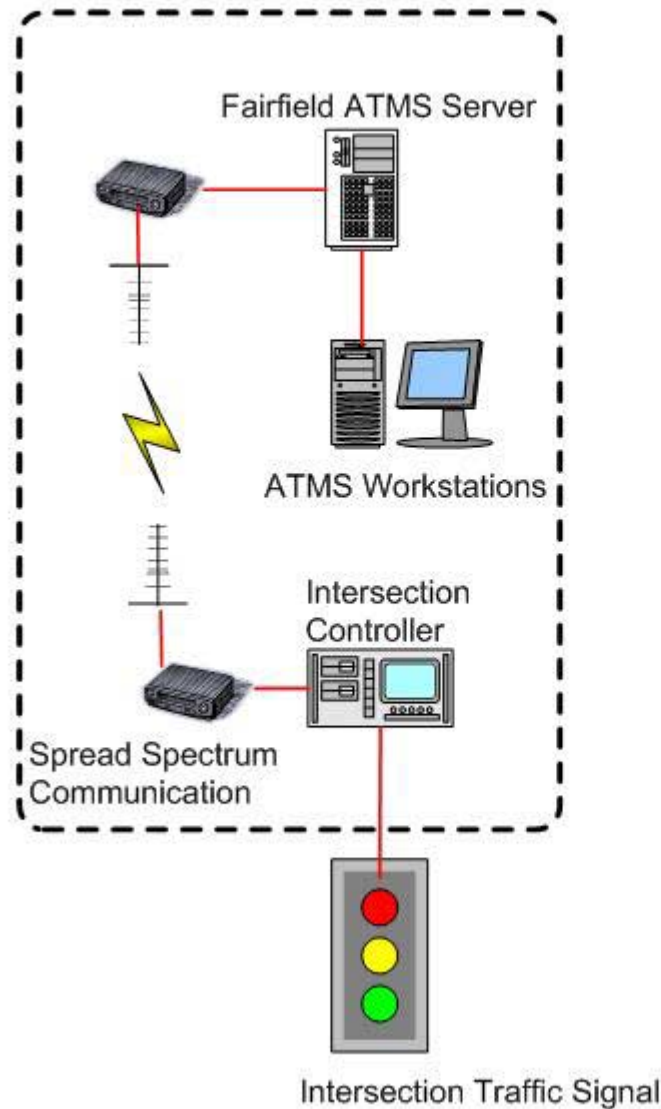
- ITS System Overview and Goals (Kevin Daughton)
- System Design and Construction (Elbert Chang)
- Planned Upgrades & Maintenance Experiences (Steve Harris)

System Overview and Goals

- Fairfield, California (pop: 105,000) is located half-way between San Francisco and Sacramento.
- System implementation part of a larger City and Countywide ITS program.
 - ◆ Need to consider interactions of controller and communications system with other elements (e.g. emergency vehicle pre-emption, transit priority and AVL).

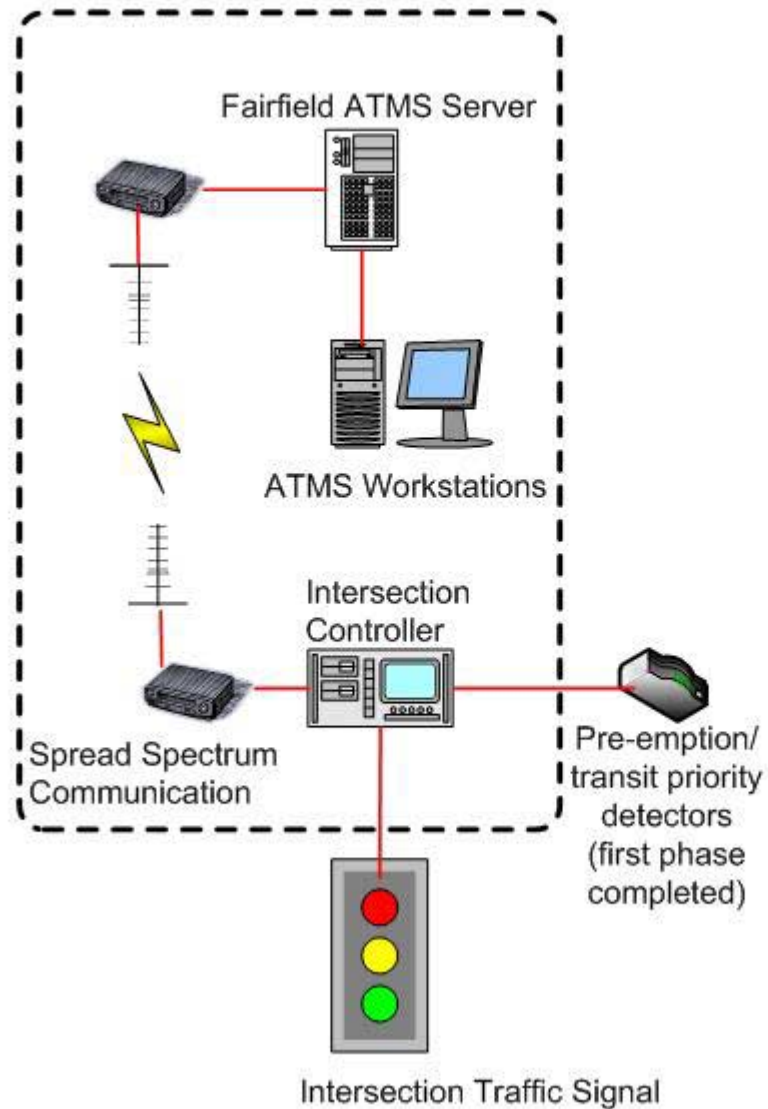
City of Fairfield Intelligent Transportation System (ITS) Program

10/12/05



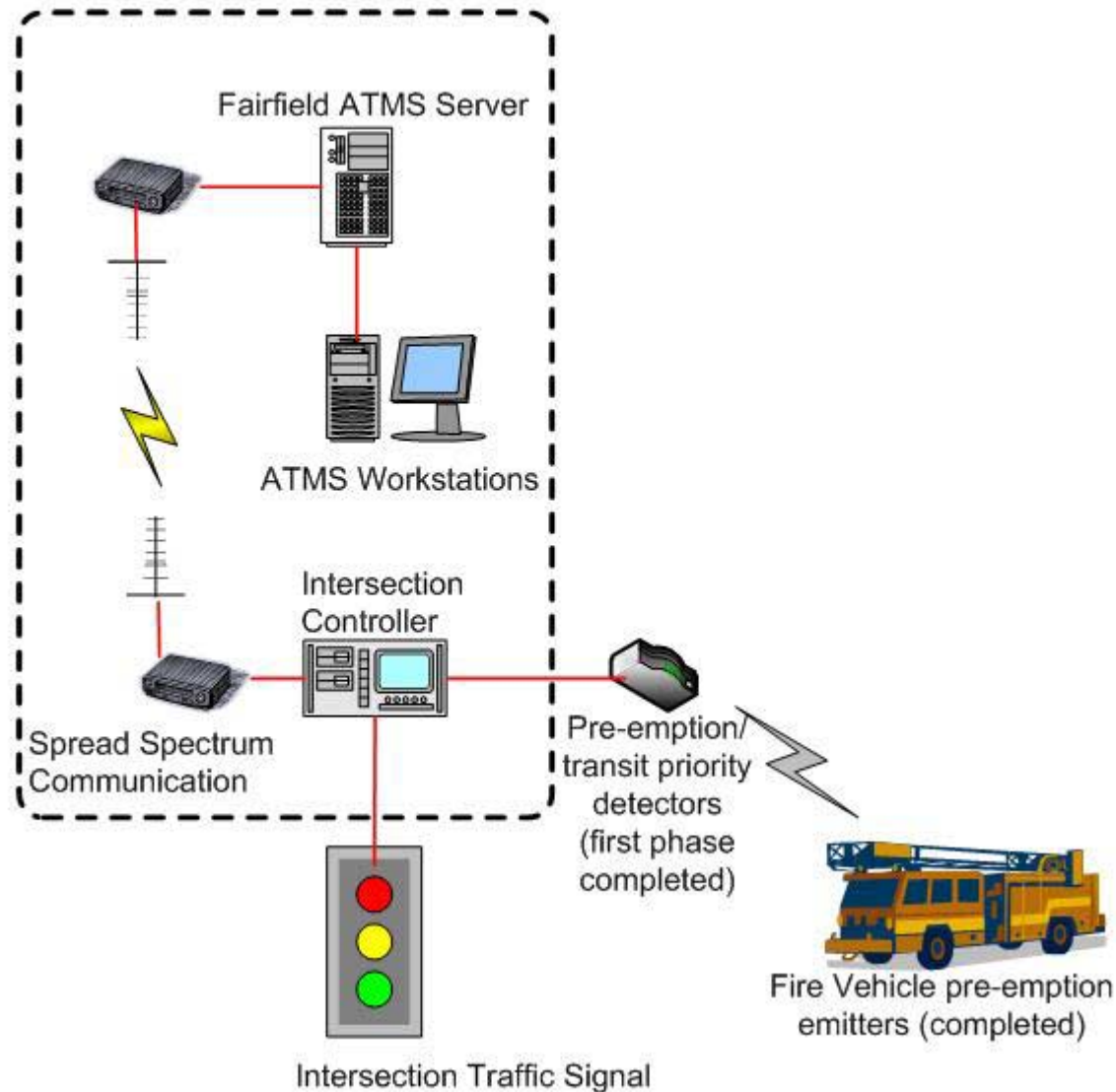
City of Fairfield Intelligent Transportation System (ITS) Program

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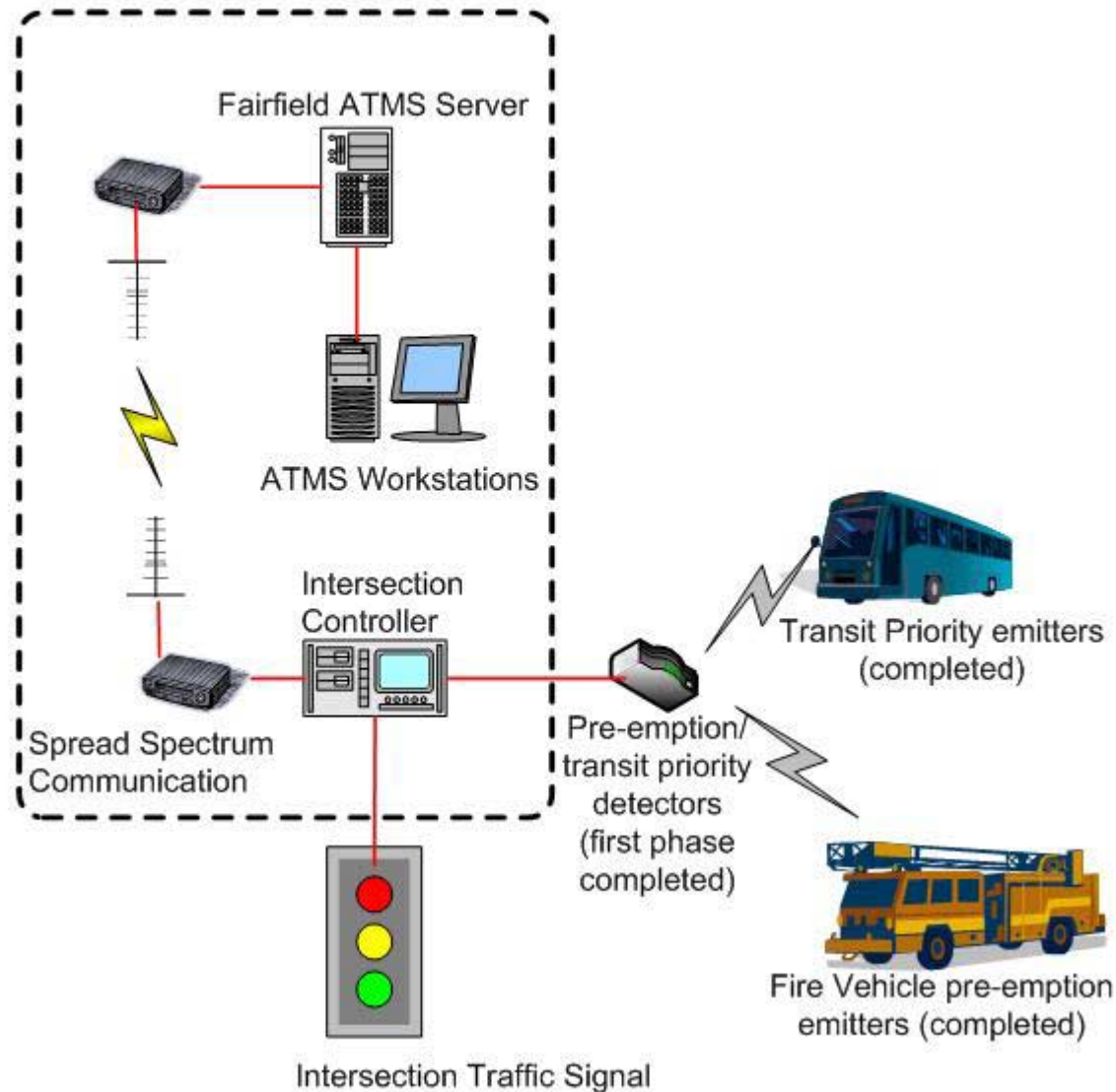
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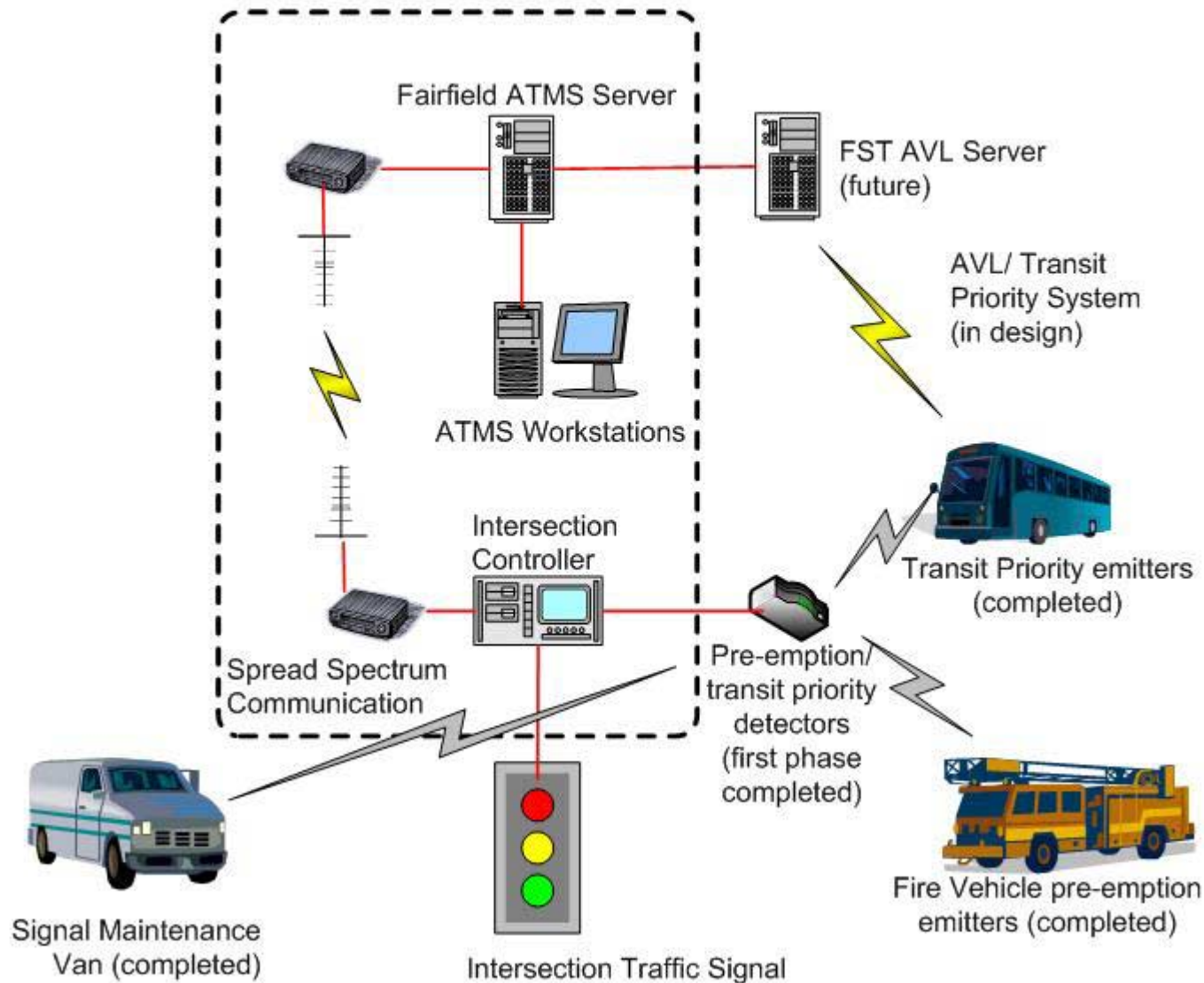


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City of Fairfield Intelligent Transportation System (ITS) Program

10/12/05



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Project Costs

| | |
|----------------|------------------|
| ■ Engineering | \$209,000 |
| ■ Equipment | \$577,000 |
| ■ Construction | <u>\$118,000</u> |
| ■ Total | \$904,000 |

(40 signals/\$904K = \$23K/signal)

Project Scope and Existing Interconnect

- Upgrade 40+ controllers (on six arterials) and provide communications between them and ATMS.
 - ◆ Wireless method chosen for quicker deployment, reduced installation cost over wireline.
- Existing Copper Interconnect
 - ◆ Gateway Avenue (3 signals)
 - ◆ Downtown West Texas Street (4 signals)
- Wireless Interconnect on North Texas Street (6 signals)

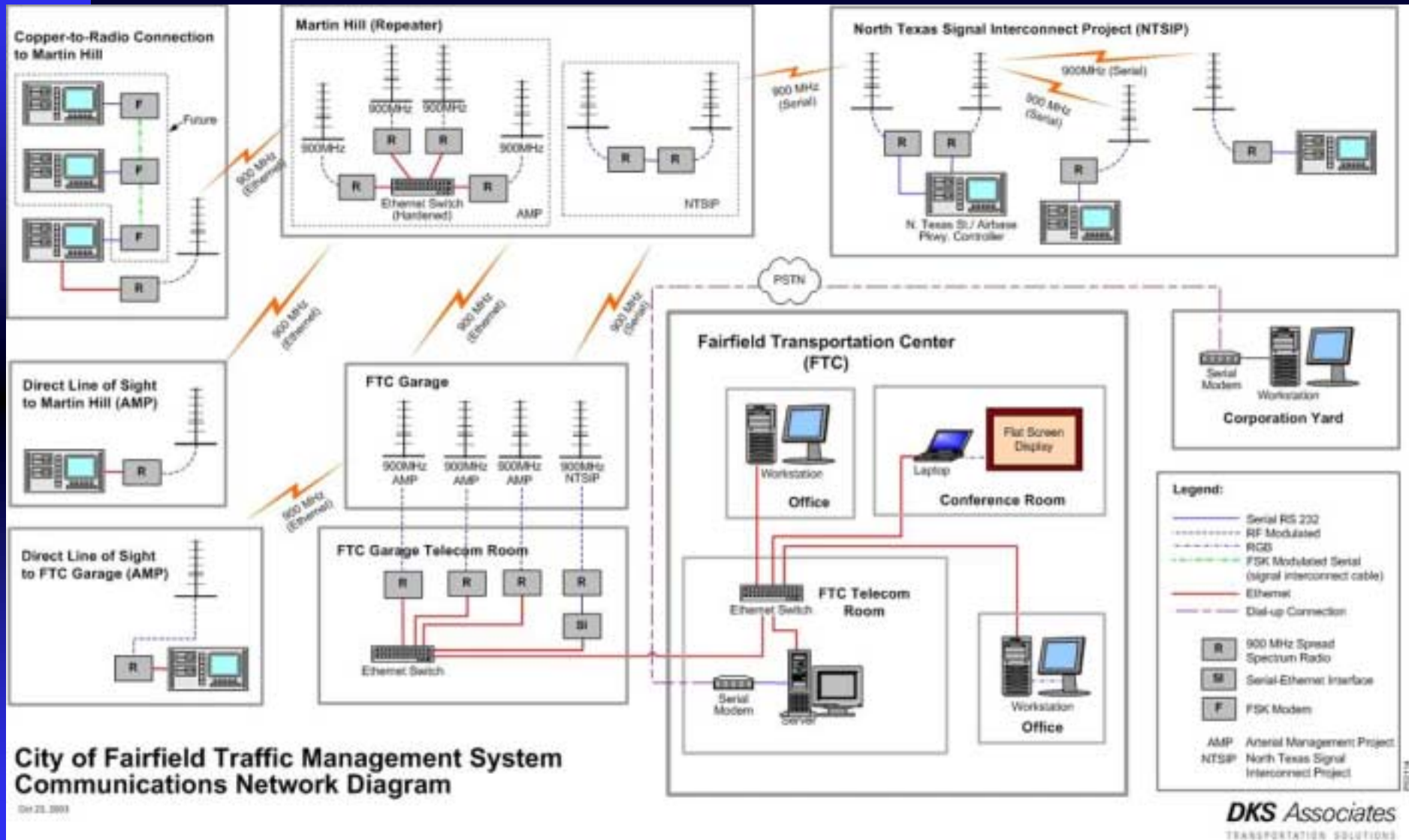
System Design and Features

- Upgrade equipment on existing wireless interconnect
 - ◆ IP/Ethernet-based, faster bandwidth
- ATMS at the Fairfield Transportation Center
- Repeater site located at Martin Hill (to address line of site issues)
- Interface with existing wireless and copper interconnect

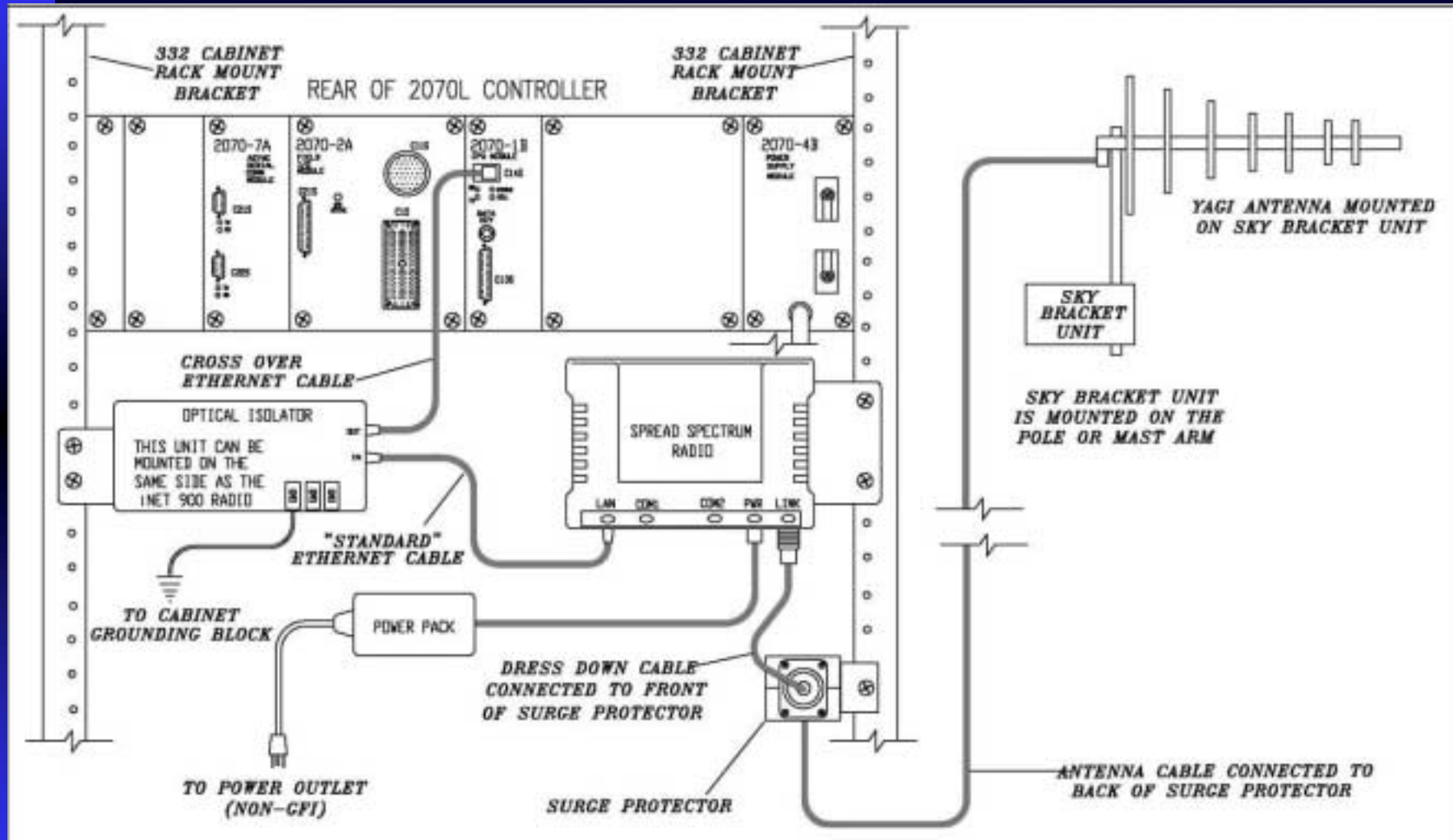
Fairfield Arterial Management Network



System Diagram



Typical Intersection Installation





Intersection Antennas

*MTC Technology Transfer Program
October 25, 2005*

Controller Cabinet



Martin Hill Repeater Site



Panoramic View from Martin Hill

Future NE
development

Air Base/ Peabody
Intersection

Pennsylvania Ave

FTC



Fairfield Transportation Center



Signal Maintenance Van



Some of the technical challenges addressed during the design and construction (1/2)

- Signal Strength/Background Interference
 - ◆ Site-and-path analysis (Need to rely on copper for some locations)
- Repeater Site Design
 - ◆ Number of radios, antenna separation
- Communications Equipment
 - ◆ City procurement of equipment
 - ◆ Bench test

Some of the technical challenges addressed during the design and construction (2/2)

■ Antenna Cable Signal Loss

- ◆ Antenna length less than 100 feet recommended for small cable (1" bending radius)
- ◆ For longer distances, low loss antenna cable (thicker) needed. Used smaller cable from antenna to nearest adjacent pull box and then connected to low loss antenna cable.

■ Changes in Wireless Technology

- ◆ System Design in 2002. If restarting design may consider other technologies (e.g. Wi-Max?, Mesh?)

Planned Upgrades

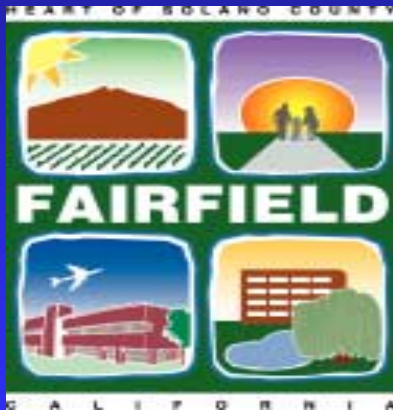
- Communication equipment for remaining City signals (approx 40)
- Use wireless system to interface directly with pre-emption phase selector
 - ◆ County-wide vehicle pre-emption codes
- Access to Streetwise ATMS server over internet (secure connection)
- Wireless communication with service van

Maintenance Experiences

- Save time/ labor by loading timing plans remotely
- Streetwise ATMS Server has gone down
 - ◆ Van to serve as back-up to server.
 - ◆ Firmware upgrade of radios, server, controller needed to allow this to happen.
- E-mail signal trouble notification implementation

Questions and Answers

City of Fairfield Wireless Traffic Signal Communication



Kevin Daughton, Transportation Manager
Steven Harris, Traffic Signal Technician



Elbert Chang, Senior Engineer